

CLAIMS:

1. A power-dividing device for a working vehicle, comprising:
a case member;
an input shaft supported by said case member so that a first end portion of the input shaft can be operatively connected to a driving source;
a PTO unit having a PTO shaft supported by said case member so as to be offset with respect to said input shaft;
a power transmission mechanism accommodated in said case member to transmit power from said input shaft to said PTO shaft; and
a first pump unit which has a first pump shaft operatively connected to said input shaft and which is fluid-connected to an actuator disposed outside.

2. A power-dividing device as set forth in claim 1, in which said first pump shaft is operatively connected to said input shaft through said power transmission mechanism.

3. A power-dividing device as set forth in claim 2, in which said first pump shaft is disposed between said input shaft and said PTO shaft in a vertical direction.

4. A power-dividing device as set forth in claim 1, further comprising:
a second pump unit which has a second pump shaft operatively

connected to said input shaft and which is fluid-connected to the actuator disposed outside.

5. A power-dividing device as set forth in claim 4, in which said second pump shaft is operatively connected to said input shaft through said power transmission mechanism.

6. A power-dividing device as set forth in claim 4, in which said first and second pump units are formed of the same components.

7. A power-dividing device as set forth in claim 4, in which said input shaft is disposed along a vehicle back and forth direction, and
said first pump unit and said second pump unit are coupled to the same side of said case member in the vehicle back and forth direction.

8. A power-dividing device as set forth in claim 4, in which said input shaft is along a vehicle back and forth direction, and said first pump unit and said second pump unit are coupled to a first side and a second side of said case member in the vehicle back and forth direction, respectively.

9. A power-dividing device as set forth in claim 8, in which said first and second pump shafts are disposed coaxially.

10. A power-dividing device as set forth in claim 4, in which
said first and second pump units respectively include first and
second pump cases coupled to said case member, first and second pump
main bodies accommodated in said first and second pump cases, and first
and second center sections supporting said first and second pump main
bodies,

each of said first and second pump cases includes a proximal end
wall having a through hole through which said corresponding pump shaft is
inserted and a peripheral wall extending in an axial direction of the
corresponding pump shaft from a peripheral edge portion of the proximal
end wall and having an opening on a free end side, said proximal end wall
being coupled to said case member,

each of said first and second pump main bodies is driven by said
corresponding pump shaft and is accommodated into the corresponding
pump case from the opening on the free end side of said corresponding pump
case, and

said first and second center sections are coupled to said first and
second pump cases, respectively, so as to close the opening on the free end
sides of the first and second pump cases.

11. A power-dividing device as set forth in claim 4, in which
said working vehicle includes a pair of left and right drive wheels
and a ground work machine,

said power-dividing device is disposed between said driving source

and said ground work machine in the vehicle back and forth direction,

said input shaft is operatively connected to an output portion of said driving source and said PTO shaft is operatively connected to said ground work machine, and

said first and second pump units are fluid-connected to a pair of left and right hydraulic motor units and for driving said pair of drive wheels, respectively.

12. A power-dividing device as set forth in claim 1, further comprising:

a charge pump unit operatively connected to said input shaft.

13. A power-dividing device as set forth in claim 1, in which said PTO unit further includes a PTO clutch mechanism for selectively engaging/interrupting power transmission from said input shaft to said PTO shaft.

14. A power-dividing device as set forth in claim 13, in which said PTO unit further includes a PTO brake mechanism for releasing/applying a braking force from and to the PTO shaft in synchronization with an operation for transmitting/interrupting power from said input shaft to the PTO shaft by said PTO clutch mechanism.

15. A power-dividing device as set forth in claim 14, in which a part of pressure oil from the charge pump unit operatively driven

by said input shaft is supplied to said PTO clutch mechanism and/or said PTO brake mechanism as hydraulic fluid.

16. A power-dividing device as set forth in claim 1, in which said input shaft and said PTO shaft are along the vehicle back and forth direction and are disposed substantially in the same position in a vehicle width direction.

17. A power-dividing device for a working vehicle, comprising:
a case member;
an input shaft supported by said case member so that a first end portion of the input shaft can be operatively connected to a driving source;
a PTO shaft supported by said case member so as to be offset with respect to said input shaft;
a power transmission mechanism accommodated in said case member to transmit power from said input shaft to said PTO shaft;
a first pump shaft operatively connected to said input shaft, and
a first pump unit main body accommodated in said case member, driven by said first pump shaft, and fluid-connected to an actuator disposed outside.

18. An axle-driving device comprising:
an axle case including an outer wall supporting a drive axle in a rotatable manner about its axis and an inner wall separated inward in a vehicle width direction from the outer wall so that an inner end portion of

said drive axle in the vehicle width direction is positioned between said outer wall and the inner wall;

a motor unit which forms a non-stepwisely changeable transmission in cooperation with an actuator disposed at a distance, the motor unit including a motor shaft supported by the inner wall in a rotatable manner about its axis so that an outer end portion of the motor shaft in the vehicle width direction is positioned in a accommodating space in said axle case, and a motor main body supported by said inner wall;

a reduction power transmission unit which includes an output gear supported on the outer end portion of said motor shaft in the vehicle width direction so as to be non-rotatable with respect to the motor shaft, a final gear supported on the inner end portion of said drive axle in the vehicle width direction so as to be non-rotatable with respect to the drive axle, and a gear train for reducing a speed of and transmitting power from said output gear to said final gear and including an intermediate shaft supported by said axle case so as to be positioned above said motor shaft; and

a brake unit for selectively applying a braking force to said intermediate shaft based on operation from outside, in which

said motor unit is disposed so that at least a portion of said motor unit overlaps with said final gear when viewed along an axial direction of said drive axle, and

said brake unit is supported by the inner wall of said axle case so as to be positioned above said motor unit.

19. An axle-driving device as set forth in claim 18, in which

said brake unit is disposed so that at least a portion of the brake unit overlaps with said hydraulic motor unit in plan view.

20. An axle-driving device as set forth in claim 18, further comprising:

a mounting stay having a proximal end portion coupled to a body frame and a distal end portion supporting said axle case, in which

said mounting stay is formed so as to define a surrounded space in which said motor unit is positioned and at least an upper side of which is open between the inner wall of said axle case and said body frame,

said brake unit includes a rotary member supported on said intermediate shaft in a non-rotatable manner, a fixed member supported by said axle case, a friction braking device which has a pair of friction discs respectively supported by said rotary member and said fixed member in a non-rotatable manner and which selectively applies a braking force to said rotary member based on operation from outside, and an operating arm for operating said friction braking device by swinging about a pivot axis disposed in parallel to said intermediate shaft, and

said operating arm can be operated from the upper opening of said surrounded space.

21. An axle-driving device as set forth in claim 20, in which
said motor unit is formed so that a connection portion to said actuator is oriented upward at a position between said operating arm of said brake unit and said body frame.

22. An axle-driving device as set forth in claim 21, in which
said actuator is a hydraulic pump unit,
said motor unit is a hydraulic motor unit fluid-connected to said
hydraulic pump unit through a flow path so as to form an HST in
cooperation with the hydraulic pump unit, and
said hydraulic motor unit has a center section formed with an oil
path which forms a portion of said flow path and a first end portion of which
forms said connection portion to the actuator.

23. A vehicle comprising:
a body frame including a pair of main frames disposed along a
vehicle back and forth direction;
an engine supported on the body frame;
a power-dividing device including a pair of hydraulic pump units
operatively connected to an output portion of the engine;
a pair of drive axles; and
a pair of axle-driving devices respectively and independently driving
the pair of drive axles, in which
each of said pair of axle-driving devices includes an axle case, a
hydraulic motor unit, a reduction power transmission unit and a brake unit,
said axle case has an outer wall supporting the corresponding drive
axle in a rotatable manner and an inner wall separated inward in a vehicle
width direction from said outer wall so that an inner end portion of the drive
axle in the vehicle width direction is positioned between the outer wall and

the inner wall, the axle case being supported by the corresponding main frame,

said hydraulic motor unit is fluid-connected to the corresponding hydraulic pump unit through a flow path so as to form an HST, the hydraulic motor unit including a motor shaft supported by said inner wall in a rotatable manner so that an outer end portion of the motor shaft in the vehicle width direction is positioned in an accommodating space in said axle case and a motor main body supported by said inner wall,

a reduction power transmission unit includes an output gear supported on an outer end portion of said motor shaft in the vehicle width direction in a non-rotatable manner, a final gear supported on an inner end portion of said drive axle in the vehicle width direction in a non-rotatable manner, and a gear train for reducing a speed of and transmitting power from said output gear to said final gear, the gear train including an intermediate shaft supported by said axle case so as to be positioned above said motor shaft,

said brake unit is formed to selectively apply a braking force to said intermediate shaft based on operation from outside,

said hydraulic motor unit is disposed so that at least a portion of the motor unit overlaps with said final gear when viewed along an axial direction of said drive axle, and

said brake unit is supported by the inner wall of said axle case so as to be positioned above said hydraulic motor unit.

24. A vehicle as set forth in claim 23, in which

each of said pair of axle-driving devices further includes a mounting stay having a proximal end portion coupled to the corresponding main frame and a distal end portion supporting said axle case,

said mounting stay is formed so as to define a surrounded space in which said hydraulic motor unit is positioned and at least an upper side of which is open between the inner wall of said axle case and said corresponding main frame,

said brake unit includes a rotary member supported on said intermediate shaft in a non-rotatable manner, a fixed member supported by said axle case, a friction braking device which has friction discs respectively supported by said rotary member and said fixed member in a non-rotatable manner and which selectively applies a braking force to said rotary member based on operation from outside, and an operating arm for operating said friction braking device by swinging about a pivot axis disposed in parallel to said intermediate shaft, and

said operating arm can be operated from the upper opening of said surrounded space.

25. A vehicle as set forth in claim 24, in which

said hydraulic motor unit has a center section formed with an oil path forming a portion of said flow path between said hydraulic pump unit and the hydraulic motor unit, and

said oil path opens upward at a position between said operating arm in said brake unit and said main frame.